merase such as T7 or SP6. The resulting products, whether truncated or complete, indicate target specific sequences.

[0085] Davey et al., EPO No. 329 822 disclose a nucleic acid amplification process involving cyclically synthesising single-stranded RNA ("ssRNA"), ssDNA, and double-stranded DNA (dsDNA), which may be used in accordance with the present invention. The ssRNA is a template for a first primer oligonucleotide, which is elongated by reverse transcriptase (RNA-dependent DNA polymerase). The RNA is then removed from the resulting DNA:RNA duplex by the action of ribonuclease H(RNase H, an RNase specific for RNA in duplex with either DNA or RNA). The resultant ssDNA is a template for a second primer, which also includes the sequences of an RNA polymerase promoter (exemplified by T7 RNA polymerase) 5' to its homology to the template. This primer is then extended by DNA polymerase (exemplified by the large "Klenow" fragment of *E. coli* DNA polymerase D, resulting in a double-stranded DNA ("dsDNA") molecule, having a sequence identical to that of the original RNA between the primers and having additionally, at one end, a promoter sequence. This promoter sequence can be used by the appropriate RNA polymerase to make many RNA copies of the DNA. These copies can then re-enter the cycle leading to very swift amplification. With proper choice of enzymes, this amplification can be done isothermally without addition of enzymes at each cycle. Because of the cyclical nature of this process, the starting sequence can be chosen to be in the form of either DNA or RNA.

[0086] Miller et al. in PCT Application WO 89/06700 disclose a nucleic acid sequence amplification scheme based on the hybridisation of a promoter/primer sequence to a target single-stranded DNA ("ssDNA") followed by transcription of many RNA copies of the sequence. This scheme is not cyclic, i.e., new templates are not produced from the resultant RNA transcripts. Other amplification methods include "RACE" and "one-sided PCR" (Frohman, M. A., In: "PCR Protocols: A Guide to Methods and Applications", Academic Press, N.Y., 1990; Ohara et al., 1989, Proc. Natl. Acad. Sci. U.S.A., 86: 5673-567).

[0087] Methods based on ligation of two (or more) oligonucleotides in the presence of nucleic acid having the sequence of the resulting "di-oligonucleotide", thereby amplifying the di-oligonucleotide, may also be used in the amplification step of the present invention. Wu et al., (1989, Genomics 4: 560).

[0088] Solid supports suitable for immobilizing nucleic acids are well known in the art and include, but are not limited to, silica-based membranes, nylon, Teflon, beads including polystyrene/latex beads, latex beads, silica beads or any solid support possessing an activated carboxylate, sulfonate, phosphate or similar activatable group, porous membranes possessing pre-activated surfaces which may be obtained commercially (e.g., Pall Immunodyne Immunoaffinity Membrane, Pall BioSupport Division, East Hills, N.Y., or Immobilon Affinity membranes from Millipore, Bedford, Mass.). Optionally, gas plasma treatments are useful in preparing a binding surface.

[0089] The "target nucleic acid" means a nucleotide sequence that may be deoxyribonucleic acid (DNA) or ribonucleic acid (RNA) (including ribosomal ribonucleic acid (rRNA), poly(A)+ mRNA, transfer RNA, (tRNA), small nuclear (snRNA), small interfering (siRNA), telomerase associated RNA, ribozymes etc.) whose presence is of interest and whose presence or absence is to be detected in the test.

[0090] Infectious agents may include viruses, bacteria, fungi, yeast, *Mycoplasma*, and the like.

[0091] FIG. **1** shows a nasal swab device **100** for human or veterinary application, which may also be used as a throat swab for human nasal swabs, or for animal nasal swabs, or for avian throat swabs. The sample collection is performed by inserting the capture end **1** of the swab into the nostrils of the subject, and briefly rotating the swab in order to collect a mucosal sample. The capture end of the swab **1** is coated with a fibrous material such as Dacron fiber to enhance sample collection efficiency.

[0092] The capture end **1** of the swab is connected to a cylindrical neck extension **2**. Different variants of the nasal swab device **100** may be manufactured with different lengths of the cylindrical neck extension **2** in order to accommodate different subject types. For example, different length swabs may be required for children compared to adults. Similarly, different length swabs would be required for human, animal, and avian applications.

[0093] Cylindrical extension neck **2** is connected to a closure **3**. Closure **3** incorporates a ratcheting thread (not shown), similar to those used in child-proof packaging applications, but not re-openable in normal use. Threaded closure **3** also incorporates a gasket element (not shown) on the underside of the cap to provide an air and liquid tight seal when the nasal swab device **100** is fitted to a sample collection tube.

[0094] After the nasal or throat swab sample has been collected, the nasal swab is screw-threadingly connected to a sample carrier or sample collection tube **4** as shown in FIG. **2**. The screw thread on the sample tube **4** only allows a one-way single use application, such that after the nasal swab device **100** has been fitted to the sample tube **4**, it is not possible to unscrew the nasal swab device **100** from the sample collection tube **4**. Furthermore, when the nasal swab device **100** is fitted, the gasket element on the underside of the closure **3** seals to the upper circumferential extremity of the sample tube **4** in an air and liquid tight manner.

[0095] The sample tube **4** is also closed at the outlet end by an integrally molded membrane element or "inner seal" **5** as shown in FIG. **3**. Thus when the nasal swab device **100** has been fitted to the sample tube **4**, the sample tube assembly **200** is in a bio-safe condition.

[0096] The tubular nose **4** of the sample carrier adjacent to the membrane element **5** (internal) also include one or a multiplicity of one-way snap-fit barbs **6** arrayed in a circular manner around the outlet. The purpose of these barbs is to allow the sample tube assembly **200** to be fitted to a microfluidics cartridge in a single-use manner such that bio-safety is maintained.

[0097] FIG. **4** shows the sample tube assembly fitted to a microfluidic cartridge **7** to create a microfluidics cartridge assembly **300**.

[0098] Sample tube assembly **200** is inserted through a bridging support element or "docking clamp" **9**, which is mounted to the microfluidic cartridge **7**. This docking clamp provides structural integrity to the connection of the sample tube assembly **200** with the microfluidic cartridge **7**. After the sample tube assembly **200** is inserted through the docking clamp **9**, the outlet end of the sample collection tube **4** is inserted into a mating hole within a bridging manifold element **8**. When the one way snap-fit barbs **6** near the outlet end of the tube enter the manifold element **8**, an undercut female locking ring near the entrance of manifold element sample